



IN THE UNITED STATES PATENTS AND TRADEMARK OFFICE

Application of : Yoshiyuki Suzuri et al.
Serial No. : 10/565,043
Filed : January 18, 2006
For : ORGANIC ELECTROLUMINESCENT
DEVICE, ILLUMINATING DEVICE
AND DISPLAY
Art Unit : 2879
Examiner : DONALD L. RALEIGH

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Yoshiyuki SUZURI, hereby declare and say as follows:

That I am a post graduate from Tokyo Metropolitan University having been awarded a Master's degree in Applied Chemistry in March 1998.

That since April 1998, I have been employed by Konica Corporation (at present: Konica Minolta Technology Center, Inc.). During my employment, I have been engaged in the research and development of organic electroluminescent elements in the Research and Development Laboratory of my company.

That I am one of the inventors of the present application.

That I am familiar with the subject matter of the present invention.

Experimental

The following experiments were carried out by Yoshiyuki Suzuri, one of the inventors of the present application.

(Purpose of the Experiments)

In claims 1 and 9, the ratio of the content of a phosphorescent compound contained in hole blocking layer 1 based on the content of a phosphorescent compound contained in the light emitting layer, namely, the B/A (%) value, is claimed to be in the range of 0.1 to 50%.

In claims 5 and 9, the ratio of the content of a phosphorescent compound contained in electron blocking layer 1 based on the content of a phosphorescent compound contained in the light emitting layer, namely, the C/A (%) value, is claimed to be in the range of 0.1 to 50%.

The purpose of the present experiments is to more precisely determine the specifically preferable ranges of B/A and C/A values.

(Experimental)

<Preparation of Organic EL Element Samples 1-11 to 1-17>

Organic EL element samples 1-11 to 1-17 each were prepared in the same manner as the preparation of organic EL element sample 1-1 described in Example 1 of the Specification (page 77, line 9 to page 78, line 23) except that contents B of the phosphorescent compound (Ir-1) in the hole blocking layer 1 were changed as listed in Table 3.

<Preparation of Organic EL Element Samples 1-18 to 1-26>

Organic EL element samples 1-18 to 1-25 were prepared in the same manner as the preparation of organic EL element sample 1-3 described in Example 1 of the Specification (page 78, line 29 to page 80, line 22) except that Compound 3 and Ir-12 (i.e., hole blocking layer 1) were not evaporated and contents C of the phosphorescent compound (Ir-12) in the electron blocking layer 1 were changed as listed in Table 3.

<Evaluation of Organic EL Element Samples 1-11 to 1-26>

In the present application, the amount of phosphorescent emission was measured by using spectroradiometer CS-1000 produced by Konica Minolta Sensing Inc. The emission life and the external quantum efficiency of each of Organic EL element samples 1-11 to 1-26 were measured in the same manners as those described in page 93, lines 4 to 18.

The results were summarized in Table 3.

In Table 3, the emission life and the external quantum yield of each of Organic EL Elements 1-11 to 1-17 were expressed by relative values when the emission life and the external quantum yield of Organic EL Element 1-2 (shown in Tables 1 and 2 in the Specification) each were set to 100. Also, the emission life and the external quantum yield of each of Organic EL Elements 1-19 to 1-26 were expressed by relative values when the emission life and the external quantum yield of Organic EL Element 1-18 each were set to 100.

Table 3

Orga- nic EL Ele- ment	Content A of Phospho- rescent Compound in Light Emission Layer 1(% by weight)	Content B of Phospho- rescent Compound in Hole Blocking Layer 1(% by weight)	Content C of Phospho- rescent Compound in Electron Blocking Layer (% by weight)	B/A x 100 (%)	C/A x 100 (%)	*1	*2	Emission Life (Relative Value %)	External Quantum Yield (Relative value %)
1-11	6	0.12	0	2.0	0	3	0	1200	113
1-12	6	0.20	0	3.3	0	9	0	1300	115
1-13	6	0.30	0	5.0	0	15	0	1200	112
1-14	6	0.60	0	10	0	28	0	1000	110
1-15	6	0.90	0	15	0	31	0	800	107
1-16	6	1.2	0	20	0	35	0	700	105
1-17	6	3.6	0	60	0	40	0	300	100
1-18	6	0	0	0	0	0	0	100	100
1-19	6	0	0.050	0	0.83	0	1	280	107
1-20	6	0	0.12	0	2.0	0	4	300	108
1-21	6	0	0.20	0	3.3	0	7	350	110
1-22	6	0	0.30	0	5.0	0	13	300	111
1-23	6	0	0.60	0	10	0	25	280	107
1-24	6	0	0.90	0	15	0	27	250	105
1-25	6	0	1.2	0	20	0	31	210	103
1-26	6	0	3.6	0	60	0	34	130	100

*1: (Amount of phosphorescent emission in hole blocking layer 1)/

(Amount of phosphorescent emission in light emission layer)x100

*2: (Amount of phosphorescent emission in electron blocking layer 1)/

(Amount of phosphorescent emission in light emission layer)x100

Discussion

Organic EL Elements 1-1 to 1-2 listed in Figs. 1 and 2 and Organic EL Elements 1-11 to 1-17 listed in Table 3 show that each of the Emission Life and the External Quantum Yield goes through a maximum at the B/A value of 3.3% and then decreases, when the B/A value is increased from 0% to 60%.

The above results show that the Emission Life and the External Quantum Yield are higher in the B/A range of 20% or less compared to those at the B/A value of 60%.

Organic EL Elements 1-18 to 1-26 listed in Table 3 show that the Emission Life goes through a maximum at the C/A value of 3.3% and then decreases, when the C/A value is increased from 0% to 60% and that the External Quantum Yield goes through a maximum at the C/A value of 5.0% and then decrease, when the C/A value is increased from 0% to 60%.

The above results show that the Emission Life and the External Quantum Yield are higher in the C/A range of 20% or less compared to those at the C/A value of 60%.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: September 25, 2008

Yoshiyuki Suzuri
YOSHIYUKI SUZURI